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## THE PRAIRIE GOPHER.

BY DR. ELLIOTT COUES, U.S.A.

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THE subject of the present history is one of a large group of small quadrupeds inhabiting the western half of North America, from Mexico to the Arctic Ocean, as well as a large portion of the northern hemisphere in the Old World. They belong to the family of the squirrels (*Sciuridæ*); in fact, they are squirrels modified in a particular way for a terrestrial instead of arboreal mode of life. We are all familiar with the common little chipmunk of the eastern states, *Tamias striatus*, and know that, on comparison with a true tree squirrel, it differs in having a shorter and less bushy tail, in possessing large cheek pouches, etc. Now *Tamias* is just one step away from *Sciurus* towards the genus *Spermophilus*; and this genus is the group to which the prairie gopher belongs. In fact *Tamias* and *Spermophilus* very nearly run together, so gradual is the transition among the several species. If we were to take a chipmunk and crop its ears down close, cut off about a third of its tail, give it a blunter muzzle, and make a little alteration in its fore-feet, so that it could dig better, we should have a pretty good spermophile, to all intents and purposes. A little further change in the same points would make a prairie dog, which is a kind of spermophile, though now placed in a different genus (*Cynomys*). An extreme of modification, still in the same direction, gives us the squat, heavy woodchucks, *Arctomys*, between which and the lithe graceful tree squirrels we see that the chain of beings is unbroken. We see now just the links which the spermophiles furnish. They are terrestrial, fossorial, gregarious squirrels — by which I mean that they live sociably in burrows under ground. The broad prairie is their home. Though one or two species are found in wooded places, yet they rarely, if ever, climb trees, and are only at home in perfectly open ground. This fact alone determines their geographical distribution. Only two species are found at all east of the Mississippi, and these too haunt the prairie. But they occur in profusion from the plains to the Pacific, from Mexico northward.

Now that we have some idea of the animals, the next thing is

to find a name for them. "Ground squirrel" would be unobjectionable and indeed appropriate, but that is already in use for the species of *Tamias*. "Marmot" is sometimes used, the present species being the tawny marmot of some writers, but this is the name of the woodchucks (*Arctomys*). "Spermophiles" they have been called; but this word is so thoroughly un-English that it will probably stay in the learned books where it arose. Naturalists, in fact, have no English name for these animals. But by the people who live among them they are universally called "gophers;" and as this name will certainly stick in the vernacular for all time, we may as well accept it. We will say "gopher," then.

I elect to write about the prairie gopher — as I shall call that particular species known in the books as *Spermophilus Richardsoni* — for several reasons. In the first place, I know more about it than I do about any other species of the genus at present. Secondly, nobody else seems to know much about it. Thirdly, it is one of the most abundant animals of our country, occurring by hundreds of thousands over as many square miles of territory, almost to the exclusion of other forms of mammalian life. Millions of acres of ground are honeycombed with its burrows. Throughout a vast stretch of country in the northwest, gopher-holes and buffalo-chips are the most noticeable points about the landscape. How far from being exhausted is the natural history of the United States, when of such an animal as this next to nothing to the point is found written down about it, beyond a description of its skin and skull and a sketch of those characteristics which it shares with other *Spermophili*! Until recently, indeed, a stuffed skin of the prairie gopher was something of a rarity. Let me make such statements good: the latest authority on North American mammals says no specimens of this species were collected by any of the Pacific railroad expeditions, and makes use of one in the Philadelphia Academy for description, collected in the Rocky Mountains by Townsend more than thirty years ago. Prof. Baird is further at pains to record the fact that in 1855 Dr. Hayden met with a small spermophile, probably of this species, in considerable numbers, north of Fort Union, but was unable to procure specimens; and goes back to Sir John Richardson (1829) for some further items of geographical distribution. Audubon's biography is almost entirely from Townsend, who evidently knew the animal well, and is very good, as far as it goes.

During a considerable portion of two years, my lines have been cast in the very home of these animals; at any rate, I fancy they cannot be more abundant anywhere else. I have crossed the continent by another route, much farther to the southward, but I never saw any animals—not even buffalo—in such profusion. I have ridden for days and weeks where they were continuously as numerous as prairie dogs are in their populous villages. Their numbers to the square mile are vastly greater than I ever ascertained those of *S. Beecheyi*, the pest of California, to be, under the most favorable conditions. In a word, their name is legion. If Dakota and Montana were the garden of the world (which they are not, however), either the gophers or the gardeners would have to quit.

Should certain portions of the Territories just mentioned ever come to be settled, the little gophers will contend with the husbandmen for the land more persistently and successfully than the Indians can hope to. Already, though the population of the gopher districts has consisted principally of Indians and certain British-American surveying parties, these insignificant quadrupeds have killed men and horses. Their holes are small, but many of them, like the burrows of the badgers, foxes and prairie wolves, will admit a horse's hoof. The risks run in buffalo hunting on horseback spring chiefly from this source; what little the huge beasts themselves can accomplish in self-defence is utterly insignificant in comparison with this ever present danger. In some regions it is impossible to gallop a hundred yards except at risk of life or limb.

My observations on the prairie gopher have been confined to a narrow belt of ground along the parallel of 49°. Exactly how far they range on either hand I am unable to say—probably farther north than south. Perhaps the upper Missouri may nearly limit their dispersion southward. Speaking generally, they extend from the Red River of the North to the Rocky Mountains. Baird speaks of their occurrence in Michigan; but I never saw any in Minnesota, nor indeed in the immediate valley of the Red River, even on the Dakota side. There the genus is represented by *Spermophilus Franklini* and *S. tridecemlineatus*. But they appear in abundance just as soon as, in passing westward, we cross the low range of the Pembina Mountains, and strike perfect prairie, characterized by the presence of such birds as Sprague's lark and

Baird's and the chestnut-collared bunting. From this point they stretch clear away to the Rocky Mountains, subsiding only among the foot-hills of the main range, where the pocket gophers (species of *Thomomys*) begin to claim the soil; but a day's march, indeed, from the rocky haunts of the little chief hare (*Lagomys princeps*). The region of the Milk River and its northern tributaries, most of which, as well as the river itself, cross  $49^{\circ}$ , is their centre of abundance. Approaching this parallel from another direction, namely up the Missouri and across country northwesterly from Fort Buford,<sup>1</sup> I first met with them near the mouth of Milk River, and they almost immediately became abundant. They doubtless extend down the Missouri to the mouth of the Yellowstone beyond. Audubon gives the latitudinal distribution from  $38^{\circ}$  to  $55^{\circ}$ . The recently described *S. elegans* and *S. armatus* of Kennicott (Proc. Phila. Acad. 1863, 158), both being mere varieties of *Richardsoni*, carry the range of the species in the Rocky Mountain region down to the vicinity of Fort Bridger.

As already said, the gophers overrun all this prairie country. Travelling among them, how often have I tried to determine in my mind what particular kind of ground, or what special sites, they preferred, only to have any vague opinion I might form upset, perhaps in a few hours' more riding, by finding the animals as plentiful as ever in some other sort of a place. Passing over a sterile, cactus-ridden, alkali-laden waste, there would be so many that I would say "this suits them best;" in camp that very night, in some low grassy spot near water, there they would be, plentiful as ever. One thing is certain, however; their gregarious instinct is rarely in abeyance. A few thousand will occupy a tract as thickly as the prairie dogs do, and then none but stragglers may be seen for a whole day's journey. Their choice of camping grounds is however wholly fortuitous, for all that we can discover, and moreover the larger colonies usually inosculate.

What a country it is, to be sure, where the most persistent of the minor inequalities of surface are little heaps of dirt alongside of little holes! But about these holes, which I suppose I ought to describe, there is nothing remarkable whatever, except their numbers. They are all pretty much alike, yet no two are exactly the

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<sup>1</sup>Fort Union, formerly a somewhat noted locality, now a mere heap of rubbish, stood about on the line between Montana and Dakota. Fort Buford, a flourishing post about two miles from the old site, now commands the mouth of the Yellowstone.

same. If we fancy an active, industrious, muscular little animal to begin to scratch with strong sharp claws, and to keep at work throwing out the dirt behind him till he has buried himself in a crooked passage that will just comfortably let him pass into the ground several feet below the surface, we have a good idea of the burrow. There is not the slight rule observed as to direction and distance, any more than there is as to location. An average sized burrow will just not admit a man's arm, except at the mouth, where it is usually funnel-shaped. It may go straight down, but generally slants very obliquely, and most frequently there is an elbow a foot or so from the surface. I do not think that the holes are anything like as deep as those of prairie dogs. I never dug one out, indeed, but I judge by the peck or bushel of earth usually thrown out, as well as by the fact that it is very easy to drown out the animals with two or three bucketfuls of water. Moreover, I am satisfied that the burrows do not, as a rule, intercommunicate — perhaps they never do, except by accident, when many animals are living side by side. Many holes are found with no earth at the entrance — a clean, circular opening in the grass. These are obviously points where the creatures have burrowed up to the surface again from below. If the animals have any preference, it is a choice of the lighter and more easily worked soils, rather than a question of location. They seem to haunt especially the slight knolls of the prairie a few feet above the general level. There the soil is looser, and the inhabitants have some little additional advantage in their view of the surrounding country. But there are plenty of burrows in the heaviest soil of the creek-bottoms. They dislike stony places for obvious reasons, yet they will often burrow beneath a single large rock. I have also found nearly horizontal holes of theirs dug from the face of an almost perpendicular bank. In short, there is endless diversity in the details of their habitations.

Of the underground life of the gophers I suppose no one knows much—certainly I do not. I am inclined to think the animals are essentially polygamous, which is a point to be considered in the question of the occupancy of the burrows. If they regularly paired, I think sufficient indication of the fact would not have escaped me. But I saw no signs of this occupation of a burrow by a pair. One gopher to a hole is the universal rule; that is, one gopher to an occupied hole. For the animals are very in-

dustrious, and in every thickly peopled region, the number of deserted burrows is out of all proportion to those in use. That not only the breeding female, but every other individual has his own domicile, cannot, I think, be doubted; and they appear to guard the gates jealously. For whenever, in the hurry of a sudden alarm, two or more gophers rush into the same hole, there is sure to be trouble. We hear, if we are near enough, a squeaking and commotion below, and the intruders are pretty sure to betake themselves off as soon as they dare. Doubtless different holes are put to different uses. The female must have her bed in which to be confined and rear her young. The male his permanent retreat. Some of the holes are storehouses. Then, I am persuaded, a great many of the shallower burrows are dug for temporary refuge and soon abandoned; for the gopher is an exceedingly timid animal, and must have a convenient place to hide. The storehouses I have discovered by accident and examined at my leisure. In places where small streams work through light soil, they continually form "cut-banks" along their convexities. By this undermining and fall of earth, burrows are frequently exposed. The storehouses I have seen were merely an enlarged excavation at the end of the passage, containing a hatful of the husks of grass seeds and the like.

There is one very curious point in the socialism of these animals. Every now and then, in odd out-of-the-way places, where there may not be another gopher for miles perhaps, we come upon a solitary individual guarding a well-used burrow, all alone in his glory. The several such animals I have shot all proved to be males; and what is singular, these old fellows are always larger than the average (some would weigh twice as much), peculiarly sleek and light-colored, and enormously fat. The earlier ones I got I suspected to be a different species, so peculiar were they in many respects. I suppose they are surly old bachelors who have foresworn society for a life of indolent ease, though if I had found them oftener among their kind I should have taken them for the Turks of the harem. It seems to be a case somewhat parallel with that of the lonely old buffalo bulls so often met with away from the herd.

The female brings forth in June. This I infer, at least, from the circumstance that July brings us plenty of young ones two-thirds grown. The young probably keep closely in the burrow until they

are of about this size — I do not remember to have seen any smaller ones running about. Without having seen a litter in the nest, I should judge the number of young produced at a birth to be about eight; at any rate, the female has constantly ten<sup>2</sup> teats; and July specimens, in worn harsh pelage, with all or nearly all of the teats in use, are frequently secured.

Of the life of the animal during the winter I know positively nothing. But two things are assured. They do not migrate, and they are not seen abroad. They must hibernate, and pass most of the long inclement season in a state of torpor. Such supplies of food as I have spoken of would not last an active animal so long.

However this may be, the gathering and hoarding of seeds seems to be their principal occupation during the summer. Amidst thousands that we pass only to see them skurry into their holes in trepidation, there are necessarily some observed which do not notice us, or at any rate do not take alarm. I have often watched them, where the grass was taller than usual, gathering their store. They rise straight up on their haunches, seize the grass-top, and bite it off. Then settling down with a peculiar jerk, they sit with arched back, and stow away the provender in their pouches with the aid of their fore paws. Their cheek pouches are not very large — both together would hardly hold a heaping teaspoonful. When duly freighted they make for their holes. Their mode of feeding, as they do, upon grass-blades or any other herbage, as well as upon seeds, is essentially the same. In their foraging excursions, they seem to have regular lines of travel. From almost every long-used hole may be seen one or more little paths, an inch or two wide, sometimes so well worn that they may be traced fifteen or twenty feet. These paths often run from one hole to another. No matter how smooth the ground, these paths are never quite straight; they repeat in miniature the devious footpath across the meadow, the mysterious something that prevents an animal from walking perfectly straight being in force here.

Though properly a vegetarian, like other rodents, the gopher is fond of meat, and I think that no small share of his summer's food is derived from the carcasses of buffalo. Wolves do not appear to be numerous, in summer at least, in this region, and the

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<sup>2</sup> One pair axillary, one pair pectoral, two pairs abdominal and one pair inguinal.



polishing of buffalo skeletons is largely accomplished by the kit foxes, badgers, skunks and gophers. Hard by a slain buffalo a badger's hole is pretty sure to be soon established, together with a number of temporary gopher burrows. In proof positive of this carnivorous propensity, I have more than once seen the inside of a drying carcass completely covered with the peculiar and readily-recognized excrement of the gophers, while the bones and flesh were gnawed in a way that plainly told who had been there. The excrement is conico-cylindric, and thus very different from that of rabbits, the only other common rodents of the region.<sup>3</sup>

The voice of the gopher is peculiar — quite unlike the harsher and more guttural “barking” of the prairie dog. It is a sharp, wiry squeak of less volume, and is pitched in a higher key, than might be expected in the case of an animal of its size. It is a single note, repeated a few times. Comical as a gopher is in some of his attitudes and motions, he never looks so funny as when squeaking. He generally gets down on all fours to it, drops his jaw with a jerk, and squeezes out the noise by drawing in his belly—it reminds one of a toy dog. If caught or wounded, they have an energetic chattering outcry, much like that of other species.

There is not the slightest difficulty in securing any desired number of specimens—as is *not* the case with the prairie dog. Though equally timid, the gopher is neither so suspicious nor so warily cautious; nor is it so tenacious of life. As is well known, the chances are largely against securing a prairie dog shot at the mouth of his burrow. No matter how badly wounded, he generally manages in his death struggles to work down out of reach, and he not seldom, when shot dead, falls out of sight. But I would readily undertake to secure half the gophers fired at when fairly in sight, no matter if they were directly over the hole. Moreover a prairie dog, scared into his hole, will scarcely show his nose for a long time, while a gopher, more inquisitive or less prudent, generally pops up again in a few moments, to have another look, and vent his displeasure in a series of energetic squeaks. Advantage may be taken of this trait to secure him alive, by simply setting a noose around the hole, and retiring to a little distance, jerking the string smartly the moment the little animal's

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<sup>3</sup> On slightly everting the anus (both sexes), there are seen three prominent conica papillæ around the margin, just inside — one anterior and one on each side.

nose appears. He is generally caught by the neck or around the chest. The soldiers used to have great fun this way sometimes, and I know of one man catching seventeen in about an hour. Fishing for gophers may not be very thrilling sport, but I should think, though I never tried it myself, that it would be quite as exciting as some other styles of angling.

I wish I could do justice to the rest of my subject — I mean to the variety of tricks and funny ways there are about a gopher, and without which no gopher is complete. But a gopher must be seen, and seen often, to be appreciated. For instance, a gopher caught away from home is a very different animal from one at the mouth of his hole. A most unreasonably timid animal, considering how rarely he is molested, he never goes out without feeling that he has taken his life in his hands. A thoroughly scared gopher is the liveliest object in nature; a mule kicking over the traces is perfect repose in comparison. He doubles up and opens out like nothing else I know of, with his absurd little whisk of a tail hoisted, and the way he gets over the ground without once looking back is amazing. Safe home, be he never so badly frightened, he will stop to see what was the matter. He pops bolt upright, stands stock still with his fore-paws drooped affectedly in front of him, looks demurely around, and squeaks out "Pooh! who's afraid?" as plainly as possible. But let one come a step nearer, and down he goes on all fours, right over the hole, where he sits and scolds with back arched up, ready for a dive. When he does finally duck out of sight, there is no mistaking his meaning; the suggestive flirt of his tail, the last thing seen, speaks volumes to a thoughtful observer.

But one must not too hastily conclude that a gopher on the prairie is always in a flurry, or that one at home is always saucy. On the contrary, like other frolicsome, heedless little creatures they are sometimes woefully imprudent, and will gambol about almost at one's feet, or enter a tent to forage for food. They are the life of the prairie, and they have afforded, to me at least, no little real pleasure. I like to watch them undisturbed, they are such pretty, sleek, comfortable creatures, so full of life, so busy, so bright. They always look as if they would like to know you better if they dared, and when they give you up as an impossibility, they go off in zigzag with mincing steps, stopping every few paces, half inclined to come back after all. A gopher never quite

knows his own mind. But the prettiest of all the exhibitions a gopher can make of himself, is when he frames his profile in the rim of his burrow. Not seldom, after running some little fellow to earth, have I stood still just by the hole, and confidently waited for his reappearance. Presently I hear a little scratching, perhaps a squeak, and then I see his head, turned roguishly to one side, to throw one bright black eye full upon me, as if to ask what manner of creature I may be to stand thus boldly at his door. He looks as if he would like to invite me in, and then laugh at me for being too big and too clumsy to enter.

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## A STATE SURVEY FOR MASSACHUSETTS.

BY PROF. N. S. SHALER.<sup>1</sup>

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WHILE Hayden with his score of coadjutors is skirmishing over the unexplored recesses of the West, reconnoitring an empire in a season, the surveyors of Great Britain are patiently unriddling their islands at a rate that will require a century for its completion.

It must not be supposed because these two kinds of workers differ so widely in their methods that either is mistaken. Each is doing legitimate work in its sphere, and each has its important scientific and economic results. Perhaps the best specimen of this system of reconnoissance work which has ever existed is now in operation in this country, under the charge of Dr. Hayden; other expeditionary surveys under the charge of Mr. Clarence King and Major Powell, have shared with Hayden the task of unravelling the complicated geology and topography of the vast area lying between the eastern and western borders of the Cordilleras of North America. The present system pursued by Hayden is admirably suited to secure the most rapid delineation of a country for correct sketch maps. A system of triangles is carried across country from mountain-top to mountain-top, so that a large number of positions are accurately determined. From good points of view the topographer delineates the intermediate country by the

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<sup>1</sup> The following extracts are taken from an article in the "Atlantic Monthly" for March. We regret that we have not space to reprint the article entire, as it forms an admirable presentation of the subject of surveys in general.—EDS.